

Rural transport and its influence on marketing of farm products in Kwara South Senatorial District, Nigeria

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ABSTRACT

Rural transportation is a major infrastructure issue facing food security in developing countries but its specific impacts are poorly documented in many sub-Saharan African countries. Specific objective of this study is to identify road types and assess the impacts of rural transport on marketing of selected crops in Kwara South Senatorial District in Kwara State, Nigeria. Data included information about the road networks, which was obtained through field observation and perception about the impacts of roads and transport services obtained through responses from 1,373 systematically (using a multi-stage approach) selected residents in the existing seven local government areas in the senatorial district. Results showed that only 44.4% of the settlements in the entire study area were connected by tarred roads, and these varied with local government areas; whereas majority of roads connecting Oke-Ero settlements were tarred, those in Ifelodun, Offa, Ekiti and Isin local government areas were largely untarred (< 60 were tarred). In terms of availability of market centers, 72.5% of the respondents reported presence of an organized market centre. Whereas at least 85% of respondents from settlements connected by tarred roads largely attributed patronage and gainful sale of farm produce to the condition of roads and transport services to their settlements, at least 9.7% of respondents in settlements connected by untarred roads claimed otherwise. The study observed significant variations in the impacts of rural transport on marketing between settlements connected by tarred roads and settlements connected by untarred roads ($p < 0.05$). The study concluded that improvement in road quality is connected to better production, marketing and exchange of farm produce in the study area.

Keywords: Market center, Rural Transport, Road types and Transport services

1. INTRODUCTION

Transport is one of the most highly engaged human activities globally; it helps in transforming the geographic attributes of freight and people from an origin to a destination and adding values to them (Rodrigue, 2013). Studies (e.g. Tunde & Adeniyi, 2012; Emiran & Hou, 2013; Lokesh & Mahesha, 2016) have shown that investment in transport reduces transport charges along rural roads (that offer

access from the main road network to a rural settlement, connects the settlement with other rural settlements and the nearest urban centers/settlements), accelerates efficient delivery of farm inputs and outputs, makes farmers' output accessible to higher market potentials and increases the level of agricultural income accruable to farmers. Road transport includes road infrastructure and transport services; road infrastructure encompasses roads of all categories, routes and path networks, while transport services encompasses transport modes (motorized and non-motorized), volume of traffic freight and passengers, level of competition and cost of transport (Lebo & Schelling, 2001; Hettige, 2006).

Rural areas have reportedly suffered poor level of road development, probably because of they are widely spaced, lowly populated and generates low income; which makes recovery of money spent on road development slow and difficult to recover (Abumere, Okafor, Oluwasola, 2002). Access roads to most farming communities in developing countries are in deplorable and generally unsatisfactory state (Blinpo, Harding and Wantchekon, 2013). The low quality of road infrastructure contributes to long average travel time, results in high transaction costs for evacuation of agricultural input and outputs, limits agricultural outputs, the isolation of rural areas and heightens poverty level in rural areas (Aloba, 1986; Akinola, 2007; Paul, et al., 2009).

Most rural roads in Nigeria are earth-surfaced roads; a few are tarred. Rural roads are also largely characterized by dusty, circuitous and rugged nature, with fragile bridges which according to studies (e.g. Ogunsanya, 1983; Ojetola & Ogunsanya, 1993) constitute major obstacles in achieving food security, high level of agricultural productivity and economic development in the area. The poor condition of the roads has reportedly contributed to the marginalization of rural areas in Nigeria (Ogunsanya, 1987; Adesanya, 1991; Fafchamps, and Shilp, 2009). The poor condition has also induced massive migration of youth from rural to urban areas and allows farming to be left in the hand of aging population (Onokerhoaye & Okafor, 1994; Odufuwa, 2006), contributing to low level of agricultural productivity (Ajiboye & Afolayan, 2009).

Generally, the poor quality of most rural roads, the low level of motorization, traffic of people and freight, and also the higher the monopolistic tendencies of private commercial vehicle operators that often result to hike in transport's fare (Olawole, 2013). Empirical findings have equally associated relatively higher transport charges with untarred road settlements (Teravaninthorn & Raaballan, 2008; Raaballan et al., 2010). Ahmed and Rustagi (1987) noted that poorer roads in Africa may have contributed to lower income of the farmers when compared to farmers in parts of Asia with better road infrastructure. The authors (Ahmed and Rustagi, 1987) also reported that transport charges in Ghana and Zimbabwe were more expensive than in Pakistan and Sri Lanka for same distance due to variations in road quality. Motorcycle operators also tend to increase their charges in wet season and when passengers-to-vehicle ratio was high in some rural settlements connected by earth surfaced road in Tanzania (Giner et al., 2013). Consequently, many people reduce their level of mobility as transportation costs increases (Golling & Rogerson, 2014), and as such quality amount of farm products such as cattle are transacted locally at reduced income level, causing reduced profit level for farmers (Kyeyamwa et al., 2008). The poor level of road development in rural areas in most developing countries is attributed to financial constraints (Owen, 1968; Ajiboye & Olaogun, 2006; Aderamo & Magaji, 2010), lack of continuity (Fayinka, 2004; Akunna, 2015), poor governance and high cost of construction especially due to lack of competition among construction companies (Spearling & Claussen, 2004; Estache & Limi, 2009), inefficient fund management (Lall et al., 2009) as well as ethnic favouritism and political clientelism (Burgess et al., 2015). On the other hands, studies (e.g. Hettige, 2006; Porter, 2014; Gachassin & Raballan, 2015) have argued that rural roads are a necessary but not sufficient condition for mobility. Therefore, provision of road to connect rural settlements with market centers within rural or urban centers ought to be complemented by efficient, reliable and affordable rural transport services to achieve the desired level of accessibility.

The present study is focused on explaining the relationship between rural transportation and marketing of farm products in selected rural areas in Kwara South Senatorial District, Kwara State, Nigeria. The specific objective of the study are to; identify the type of roads to selected settlements, assess the presence or absence of market centre, assess the level of patronage of various market centres and evaluates the impacts of road and transport services on marketing of farm produce in the study area.

Study Area

The study area, Kwara South Senatorial District, Kwara State, Nigeria, is located in latitude 8°0'7"N - 9°4'29"N and Longitude 4°29'48"E - 5°32'37"E in the North Central part of Nigeria by geo-political division (Figure 1). The area consists of seven Local Government Areas; Ekiti, Ifelodun, Irepodun, Isin, Offa, Oke Ero and Oyun with populations of about 48212, 197208, 173539, 47,880, 158181, 48550 and 71004, respectively. The climate of the study area is tropical, characterized by wet and dry season with an intervening cold harmattan occurring mostly from December to January.

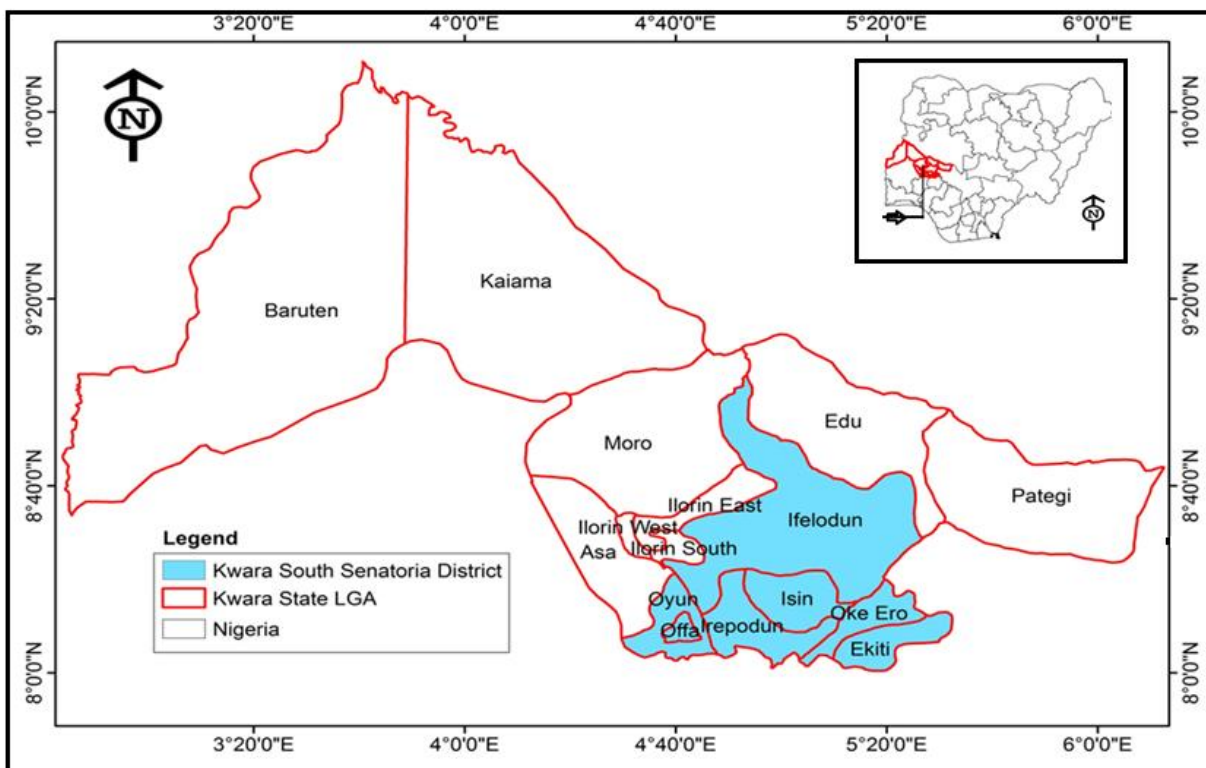


Figure 1: The study area, Kwara South Senatorial District in Kwara state, Nigeria.

Source: Digitized from the Office of the Surveyor General of the Federation (OSGOF)

The wet season begins towards the end of March till around the end of October. Annual rainfall ranges from 1000mm to 1500mm, and mean temperature ranges from 25°C to 30°C (Oyegun, 1983; Olaniran, 2002; Olanrewaju, 2009). The area is in the transitional zone of both climate and vegetation, and is characterized by vegetation range of guinea and derived savanna (Oyegun, 1983). Typical trees in the region are acacia and locust bean, among others. Road transport is the most popular means of transport in the area. The low quality of most of the roads and the low traffic of freight and passengers in most rural settlements results in long waiting time for vehicles. Consequently, commercial motorcycle becomes a more popular mode of transport used for transport services; despite being more expensive.

The study area has been selected for study because it has a vast area of land that support the cultivation of several varieties of crops (KSG, 2007). Food crop such as cassava, yams, maize, guinea corn, groundnut and vegetables as well as tree crops such as cashew are commonly grown in the area. Cashew is becoming increasingly more popular in the area because of its high financial returns to farmers, its ability to thrive on a wide variety of soil and its drought resistance. Road transport is the most popular means of transport in KSSD as it is in most part of Nigeria. Despite its high degree of relevance for the socio-economic development of the area, the level of road development in most settlements in the senatorial district is very low. Studies have shown that most road development effort in Kwara state is concentrated in Ilorin the state capital. Adesanya (2001) observed the allotment of inadequate attentions to rural development in Nigeria. A scenario attributed to inadequate financial support by the LGA saddled with the responsibility of maintaining rural roads (Aderamo and Magaji, 2010). The poor quality of road development in rural settlements and the prevailing low level of freight and passengers contributes to long waiting time and popularized the use of motorcycle (okada transport) in the area. Most of the farmers usually trek to and from farms and convey their farm inputs and out by head portage; except where the farmer personally owns other transport modes such as cars, motor cycle and bicycle, among others (Ogunsanya, 1987).

2. MATERIALS AND METHODS

Data for this study was obtained from primary and secondary sources. The primary data was obtained directly from crop farmers in the study area. The primary data was collected through the administration of questionnaire. The questionnaire was administered to heads of households with crop farming experience of not less than two years; due to the believe that they have enough farming experience to provide answers to relatively long-term durational questions posed in the questionnaire on the impacts of rural

transport on accessibility to farm inputs in the area. The questionnaire made up of both open ended and close ended questions. The sample frame for this study included all rural settlements in all the seven Local Government areas in Kwara South Senatorial District. These are settlements with population less than 20,000 (UN-Habitat, 2006).

Multi-stage sampling technique was used for selections of sites and samples for this study. First, all the settlements in each of the seven Local Government Areas (LGAs) in the Senatorial District were arranged in the order of their population size (based on the projected 2017 population estimate) and those whose population are at most 19,999 were selected as rural settlements. This gave rise to 309 rural settlements; which were stratified into three population groups A (1-6500), B (6501-13,000) and C (13001-19999). Invariably, 293, 12 and 4 settlements were found in group A, B and C, respectively.

Second, a sample size of 10%, 30% and 45% of settlements was taken from groups A (1-6,500), B (6,501-13,000) and C (13,001-19,999). The reason for the progressive increase in the percentage of settlement from group A-C is that was to allow a reasonable representation of each group in each of the LGAs in the senatorial district. Eventually, a total of 30, 4 and 2 settlements were selected in groups A, B and C, respectively.

Also, computation was based on the number of households in each selected settlement with the use of average households' size of 4.6 people declared in the result of the National population survey (Nigeria, 2014) Third, 10% of households was sampled from settlements in group 1 (1-6,500). Previous works such as Ogunsanya (1983) and Olawole (2013) employed the sample proportion and suggested its appropriateness for rural research. However, for those settlements between group 2 (6,501-13,000) and group 3 (13,001-19,999), a sample of 5% of households each will be taken due to the relatively larger population sizes of settlements in these groups that may be too difficult to manage due to limitation of time and cost available for this research. At the end of the day the samples from each LGA are Ekiti (36), Ifelodun (407), Irepodun (327), Isin (113), Offa (6), Oke-Ero (263) and Oyun (221). A total sample of 1,373 was taken in all.

Again, in order to achieve objectivity in the selection of households in each of the sampled settlements, all households in each of the selected settlements were listed and numbered; simple random sampling technique (lottery method) was then used to select the first sample, while systematic sampling was used to choose subsequent samples in the list at regular intervals of "K", until the required number of households is obtained. The interval "K" was obtained by dividing the total households listed per settlements by the value obtained from the 10% or 5% of sample household size per settlements.

The size of the 'K' value depends on the number of households in each sampled settlements. The K-value was determined by equation 3.1

$$K = N/n \text{equation 3.1}$$

Where K = the sampling interval

N = the number households per settlements/dwelling housing units (per settlements)

n = 10% or 5% of households' size per settlement.

The Secondary data used for this study included the digitized maps of the study area, collected from the office of surveyor general of the federation on a scale of 1:10 km and the 1991 population census figure of the study area obtained from the National Population Commission Office, Ilorin. The available figures was used to generate the 2017 population estimate of the area using 1.03% growth rate for rural areas and 4.3% growth rate for urban areas; as specified for Nigeria (World Bank, 2016). The 1991 population census was used because its uniqueness in presenting the population of the study area on settlement by settlement basis.

The administered questionnaires were coded and Epidata was used for the data entry, Statistical Package for Social Sciences (SPSS) version 16.0 was used for the editing and analysis of the data. Both descriptive and inferential statistics was used in the data analysis. Descriptive statistics (percentages, tables, cross tabulation, stacked bar graph) and inferential statistics (Levene and Student T-tests) were used for the analysis. All settlements in the study area were grouped into two categories (settlements connected by tarred roads and settlements connected by untarred roads).

3. RESULTS AND DISCUSSION

Types of Roads from major inter-state roads to Settlements

Figure 2 shows that 44.4% of the settlements were connected by tarred roads while 55.6% were connected by untarred roads. Local government areas-based analysis indicated that, 100%, 76.5%, 50%, 50%, 40% and 28.6% of selected settlements in Offa, Irepodun, Isin, Ekiti Oyun and Ifelodun local government areas, respectively were connected by untarred roads. On the other hand, 100% of the settlements sampled in Oke-Ero local government area were connected by tarred road as at the time of carrying out this

research. The higher proportions of untarred roads must have been impacting negatively marketing of farm produce in the study area. This is because transport's fare has been noticed to be three times more expensive in untarred road (Ipingbemi, 2010) as the rough and rugged condition of untarred road increases the operation cost of vehicle operators. Also, transport charges particularly increase in wet-season as most untarred road becomes slippery, muddy and difficult for vehicles to use ((Ninni, 1997; Hine and Ellis (2001). World Bank, (2000) earlier that, rural Africa suffered greatly from poor access to market due to poor transport facilities. This invariably deprives farmers the appropriate level of gains in their agricultural venture (Rogerson, 2014, Huelenbroek, Opuda-Asibo and Verbeke, 2008).

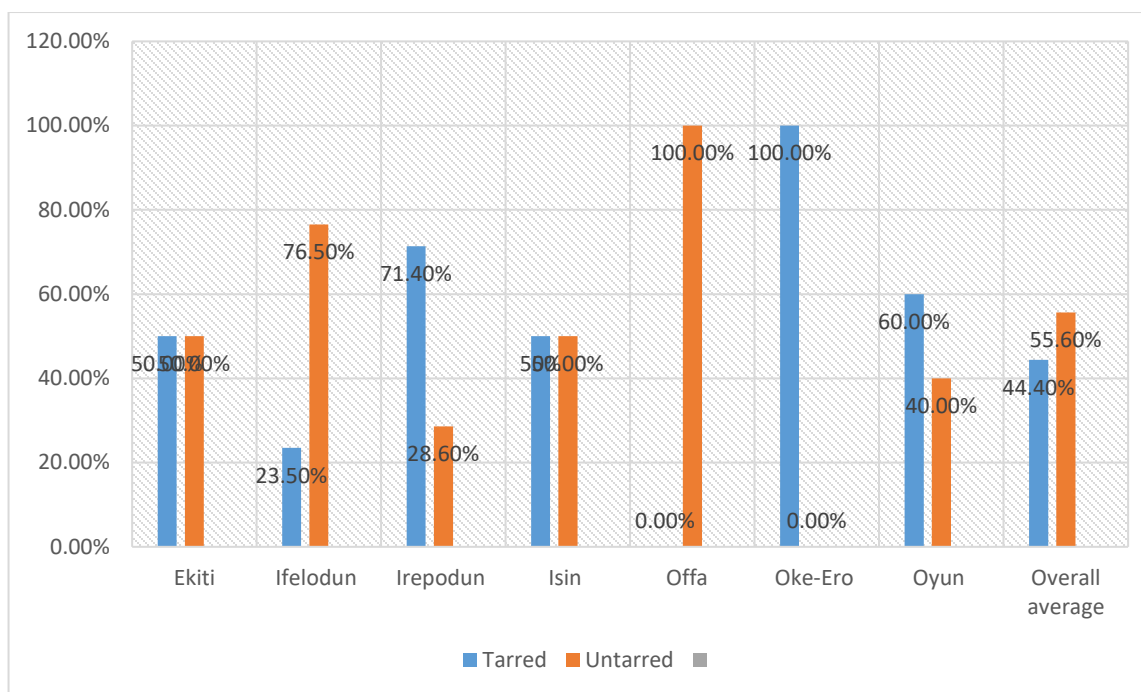


Figure 2: Percentage distribution of tarred and untarred roads to selected settlements in each local government areas in Kwara South Senatorial District, Kwara State

Market services

Figure 3 revealed that 72.5% of the respondents constituting the majority acknowledged the presence of market center in selected settlements in the study area while the minority (27.5%) subscribed to the absence of market centers in their various settlements. The result further revealed that 15.7% of respondent in settlements connected by tarred road(s) compared with 16.0% of respondents in settlements connected by untarred roads had no market centers in their settlement. The relatively higher proportion of respondents attesting to the absence of market centers in settlements connected by untarred road may be associated with the poor quality of road, the presence of many settlements connected by untarred roads and the scattered nature of these settlements, imbalances in the inflow and outflow of traffic and the generally poor transport services. Rural Africa has been known to suffer greatly from poor access to market due to poor transport facilities (World Bank, 2000). Poor quality of road has been identified as a cog in the wheel of sustainable agricultural production and marketing through associated high transport charges that denies farmers not only access to market; but largely contributes to the rotting of some of their produce and invariably denied farmers the appropriate level of gains in their agricultural venture (Rogerson, 2014, Huelenbroek, Opuda-Asibo and Verbeke, 2008). The end result is that some of the farm produce could get rotten. This is one of the reasons why farming has not been gainful to most farmers in rural areas, in Nigeria.

Figure 4 revealed that, 8.4% of respondents strongly disagreed and 15.8% of respondents disagreed that the road to the settlement promotes high patronage of agricultural produce. On the other hand, 28.8% of respondent agreed and 46.5% of the respondents strongly agreed that the road to their settlement promotes high patronage of agricultural produce. The remaining 0.5% of the respondents declined comments. Further analysis revealed that 2.1% of respondents in settlements connected by tarred road(s) compared with 38.4% of respondents in untarred road settlement strongly disagreed that roads to their settlement influences patronage of agricultural produce. On the contrary, 9.6% of respondents in settlements connected by tarred road(s) compared with 45.6% of respondents in settlements connected by untarred road(s) disagreed that roads to their settlement

influences high patronage of agricultural produce. Also, 53.6% of respondents in settlements connected by tarred road compared with 12.7% of respondents in settlements connected by untarred road strongly agreed that roads to their settlement influences patronage of agricultural output.

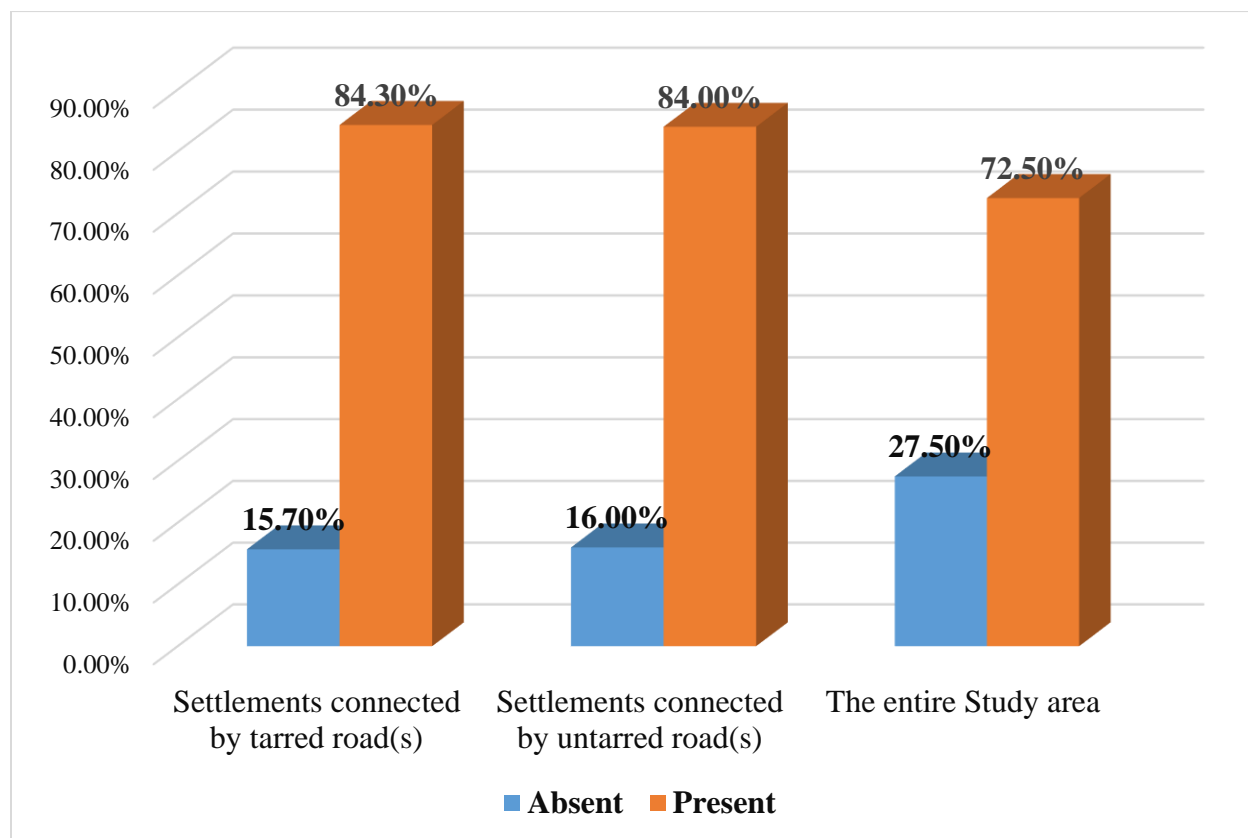


Figure 3: Perception on the presence or absence of Market Center across selected settlements

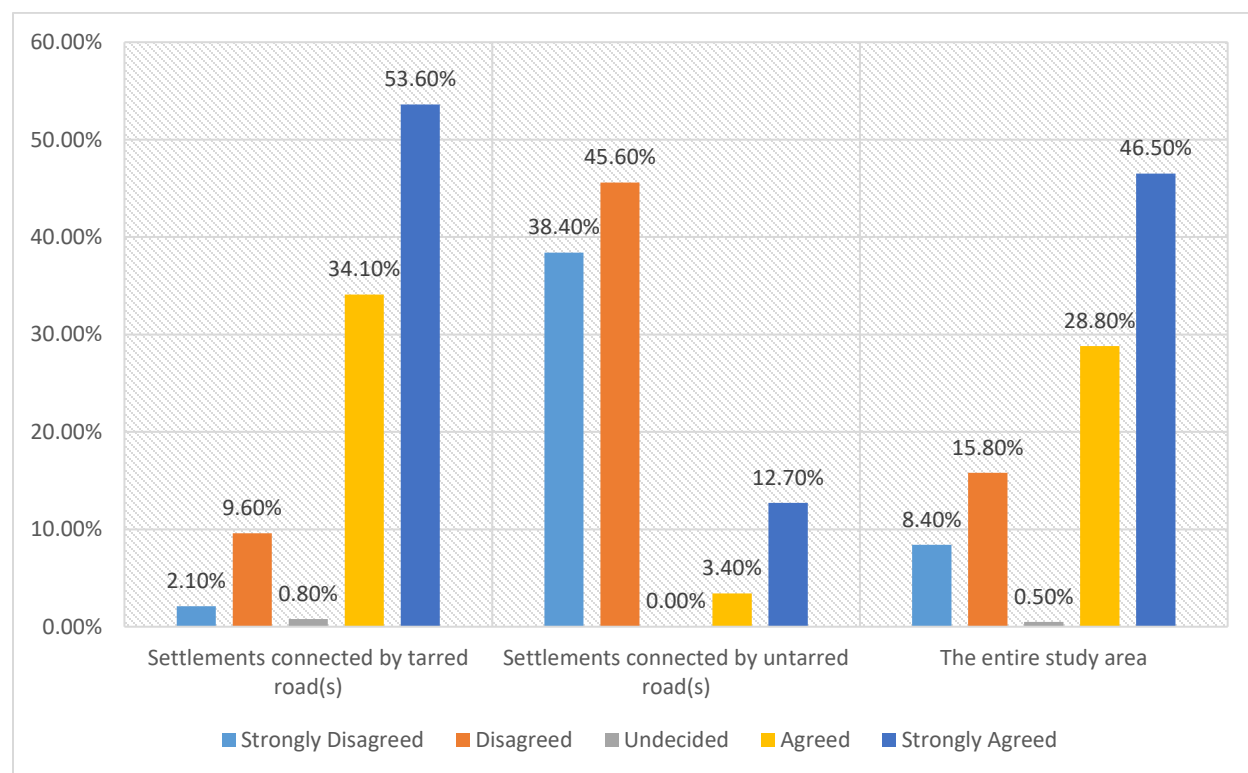


Figure 4: Road Influences on patronage of Agricultural Produce

In Figure 5, about 26.2% disagreed that the roads to their settlement influences gainful sale of their agricultural produce. On the other hand, 28.8% of the respondents agreed and 46.5% strongly agreed roads have influence on gainful sale of agricultural produce. Only 2.1% of respondents in 'settlements connected by tarred road(s)' compared with 42.6% of respondents in 'settlements connected by untarred road(s)' strongly disagreed and 10.3% of respondents in 'settlements connected by tarred road(s)' compared with 49.8% of respondents in 'settlements connected by untarred road(s)' disagreed that the road leading to their settlement influences gainful sales of agricultural produce. Conversely, 33.9% of respondents in settlements connected by tarred road(s)' compared with only 4.2% of respondents in settlement connected by untarred road agreed and 52.1% of respondents in 'settlements connected by tarred road(s)' compared with only 19.4% of respondents in 'settlements connected by untarred road(s)' strongly agreed that that roads to their settlement influences gainful sales of agricultural produce. This shows that, gainful sales of agricultural produce depend largely on the condition of the road due to the influence of road quality. Porter (2002) reported that living in settlements connected with poor road quality results in poor access to market due to high transport's fare; this shows that, high patronage of agricultural produce depends largely on road quality (Millennium Development Authority, 2004). Previous studies observed high quality roads influences reduction in transport charges and positively impacts on gainful marketing of agricultural outputs (Ellis, 2011; Gilbert and Lianto, 2012; Ali et al., 2015; Atkin and Donaldson, 2015).

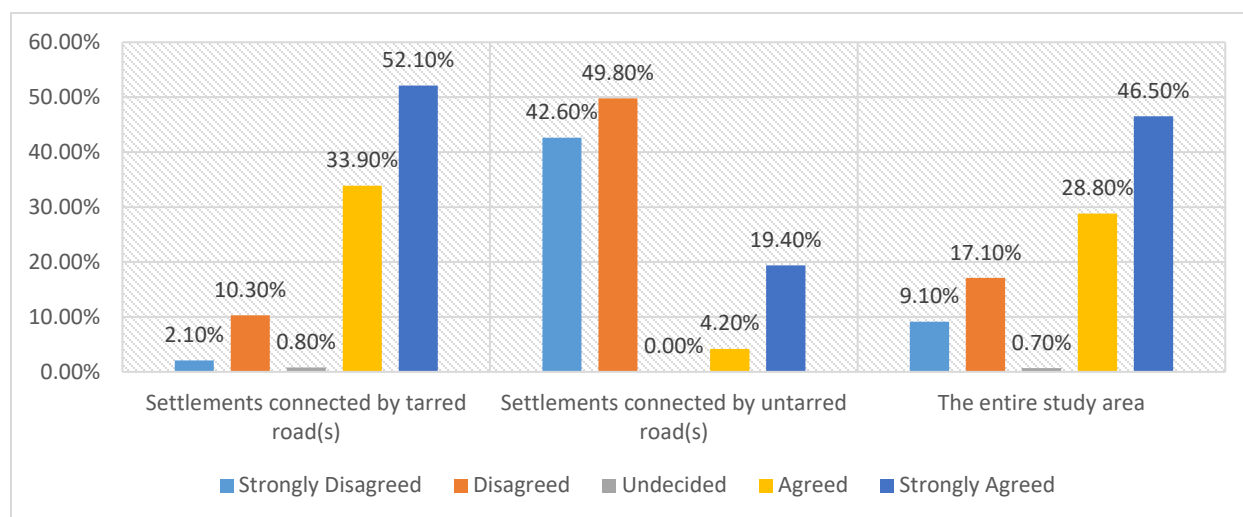


Figure 5: Road Influences Gainful Sales of Agricultural Produce

A two-sample Student's t-test assuming equal variances using a pooled estimate of the variance was performed to test the hypothesis that the of four statements addressing the influences of road on marketing of farm produce (Road influences sale of agricultural produce, Road influences high rate of marketing of agricultural produce, Road influences high price and gainful sale of agricultural produce and Road influences better patronage of agricultural produce) in the two category of settlements are equal (Tables 1 and 2). The independent t- test compares the mean between two unrelated groups on the same continuous, dependent variables. The t-test procedure allows the test of equality of variances (Levene's test) and the t-value for both equal and unequal – variance. The results of the independent t-test as shown in (Table 2.1 and 2.2).

Interpretation of the test on influence of road on marketing of agricultural output as presented in Table 2 revealed that the mean influence of road on marketing of agricultural produce in settlements connected by tarred road(s) were significantly different from mean influence of road on marketing of agricultural produce in untarred settlements with p values (0.001, 0.002, 0.008 and 0.00); which were all less than 0.05; ($p < 0.05$). This means that, the null hypothesis which says that "there is no significant variations on the influence of road on marketing of agricultural produce in the two categories of settlement (settlements connected by tarred road' and settlements connected by untarred road(s)' is rejected. Hence, the alternative hypothesis which states that, there is a significant variation on the influence of road on the sale of agricultural produce in the two categories of settlement is accepted.

Table 1: The results of the independent t-test on the impacts of roads on marketing of farmers' crop yields

	Settlements by road types	N	Mean	Standard deviation	Standard Error	Mean difference	F-value	Sig	T	Df	Sig-(2-tailed)
Road influences sale of agricultural produce	Tarred Road	1136	4.65	0.637	0.019	.038	10.746	0.001*	0.763	1371	0.446
	Untarred Road	237	4.62	0.934	0.061	.038			0.598	283.480	0.550
Road influences high rate of marketing of agricultural produce	Tarred Road	1136	4.42	0.771	0.023	1.711	9.282	0.002*	31.692	1371	0.000*
	Untarred Road	237	2.71	0.679	0.044	1.711			34.424	374.268	0.000*
Road influences high price and gainful sale of agricultural produce	Tarred Road	1136	4.33	0.805	0.024	1.642	7.158	0.008*	29.123	1371	0.000*
	Untarred Road	237	2.68	0.711	0.046	1.642			31.587	373.596	0.000*
Road influences better patronage of agricultural produce	Tarred Road	1136	4.42	0.820	0.024	1.669	26.842	0.000*	29.491	1371	0.000*
	Untarred Road	237	2.75	0.640	0.042	1.669			34.619	415.099	0.000*

Figure 6 revealed that, 7.7% of the respondents strongly disagreed and 17.7% disagreed that, the transport services in their settlement influences high patronage of agricultural produce. On the other hand, 25.5% of the respondents agreed and 48.3% strongly agreed that, the transport services in their settlement influences high patronage of agricultural produce. The remaining 0.8% declined comments on the issue. Analysis of the impacts of transport services in the two categories of settlements revealed that 0.9% of respondents in settlements connected by tarred road(s) as opposed to 40.1% of respondents in settlements connected by untarred road(s) strongly disagreed and 12.7% of respondents in settlements connected by tarred roads compared with 41.8% of respondents in settlements connected by untarred road(s) disagreed that the transport services to settlement promotes high patronage/sales of agricultural produce. On the other hand, 27.9% of respondents in settlements connected by tarred road compared with only 13.9% of respondents in settlements connected by untarred road and 57.7% of respondents in settlements connected by tarred road compared with only 3.4% of respondents in settlements connected by untarred road(s) strongly agreed that the transport services to sample settlement promotes high patronage/sales of agricultural produce. The result shows that transport services impacts positively on high patronage of agricultural produce in the study areas.

The result presented in Figure 7 revealed that, 9.8% of the respondents strongly disagreed and 16.7% disagreed that, the transport services in their settlement promote gainful sale of agricultural produce. On the other hand, 43.0% of the respondents strongly agreed and 29.8% agreed that, the transport services along the road to their settlement influences gainful sale of agricultural produce. The remaining 0.7% declined comments on the issue. Analysis at the level of two categories of settlements revealed that, 2.6% of respondents in settlements connected by tarred roads compared with 43.9% of respondents in settlements connected by untarred road(s) strongly disagreed and 10.5% of respondents in settlements connected by tarred road(s) compared with 46.4% of respondents in settlements connected by untarred road(s) disagreed that the transport services to their settlement promotes gainful sales of agricultural produce. On the other hand, 35.2% of respondents in settlements connected by tarred road(s) as opposed to 3.8% of respondents in settlements connected by untarred road(s) agreed and 50.7% of respondents in settlements connected by tarred road(s) as opposed to only 5.9% of respondents in settlements connected by untarred road(s) strongly agreed that the transport services to the sample settlement promotes gainful sales of agricultural produce. The impacts of transport services

to settlements on gainful sales of agricultural produce seemed to be similar to the impacts of road on gainful sales of agricultural produce (Figure 3 and 4) discussed earlier in this paper. This is because, as the quality of roads to a particular settlement improves transport services also improves. Improved condition of transport has been adjudged to elicit notable improvement in the market situation of the people and vice versa (Atkin Donaldson, 2015).

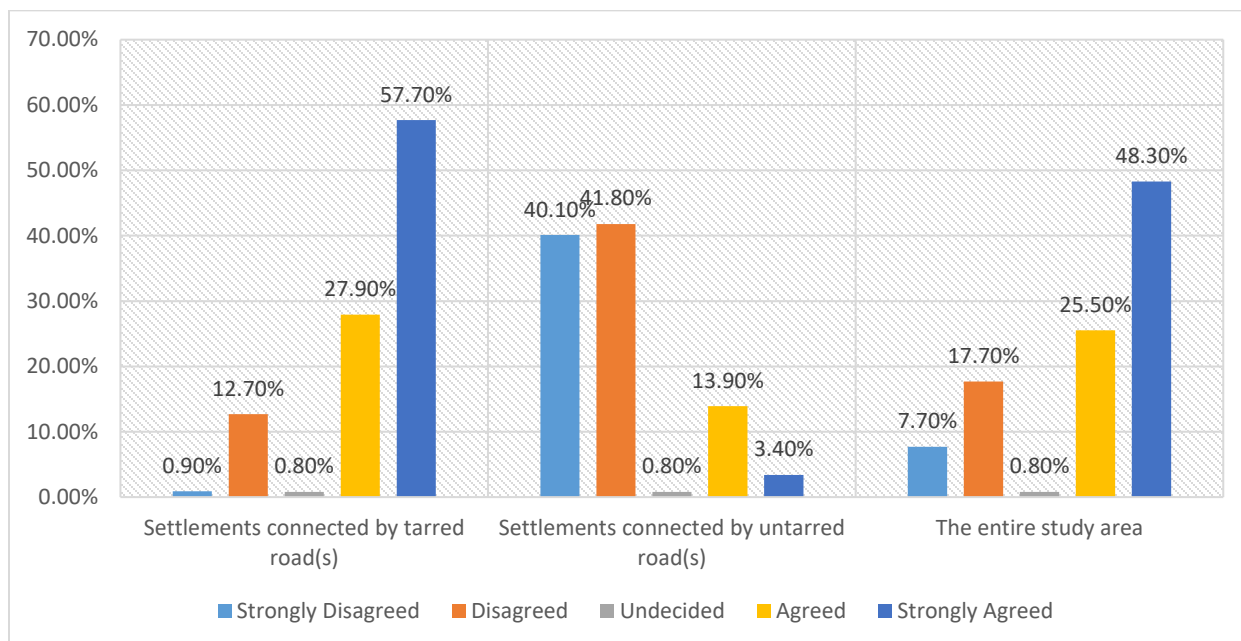


Figure 6: Transport Services Influences high patronage of agricultural produce

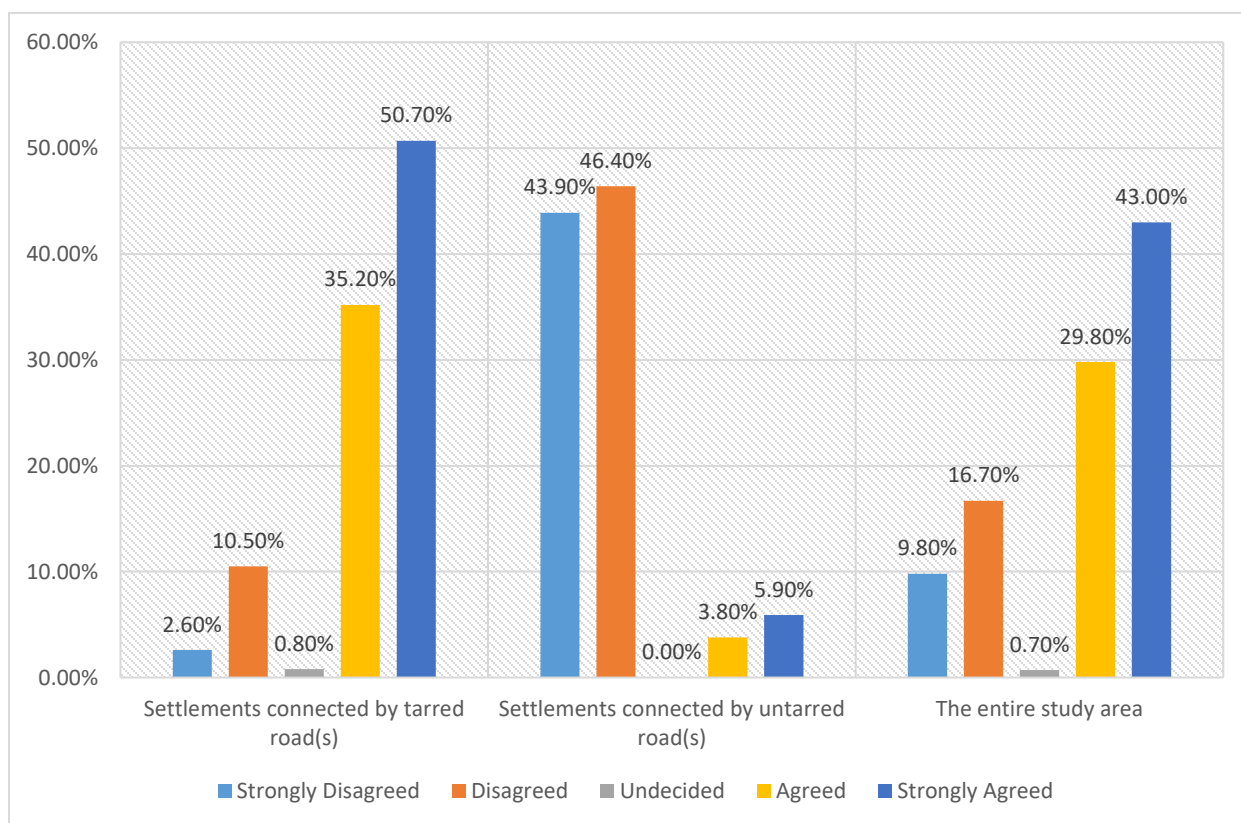


Figure 7: Transport Services and gainful Sales of Agricultural Produce

A two-sample Student's t-test assuming equal variances using a pooled estimate of the variance was performed to test the hypothesis that the of four statements addressing the influences of Transport services on marketing of farm produce (Transport services influences sale of agricultural produce, Transport services influences high patronage agricultural produce, Transport services influences gainful sale of agricultural produce and Transport services influences better patronage of agricultural produce) in the two category of settlements are equal (Tables 3 and 4). The independent t- test compares the mean between two unrelated groups on the same continuous, dependent variables. The t-test procedure allows the test of equality of variances (Levene's test) and the t-value for both equal and unequal –variance. The results of the independent t-test as shown in (Table 2).

Interpretation of the test on influence of transport services on marketing of agricultural output as presented in Table 2 revealed that the mean influence of transport services on marketing of agricultural produce in 'settlements connected by tarred road(s) were significantly different from mean influence of transport services on marketing of agricultural produce in untarred settlements with p values (0.000, 0.013, 0.014 and 0.00) less than 0.05 ($p < 0.05$). This means that, the null hypothesis which says that "there is no significant variations on the influence of transport services on marketing of agricultural produce in the two categories of settlement (settlements connected by tarred road' and settlements connected by untarred road(s)' is rejected. Hence, the alternative hypothesis which states that, there is a significant variation on the influence of transport services on the sale of agricultural produce in the two categories of settlement is accepted.

Table 2: The results of the independent t-test on the impacts of Transport services marketing of farmers' crop yields in settlements connected by tarred roads and settlements connected by untarred roads

Descriptive statistics			Variation (Leven test)						Student's T-Test of Equality		
	Settlements by road types	N	Mean	Standard deviation	Standard Error	Mean difference	F-value	Sig	T	Df	Sig-(2-tailed)
Transport services influences the sale of agricultural produce	Tarred Road	1136	4.67	0.645	0.019	14.330	0.000*	.851	0.851	1371	0.395
	Untarred Road	237	4.63	1.011	0.066			.841	.841	277.34	0.522
Transport services influences the high sales/marketing of agricultural produce	Tarred Road	1136	4.43	0.812	0.024	8.227	0.013*	30.51	30.51	1371	0.000*
	Untarred Road	237	2.70	0.713	0.046			33.20	33.20	375.12	0.000*
Transport services influence higher prices/gainful sales of agricultural produce	Tarred Road	1136	4.33	0.825	0.024	6.082	.014*	28.88	28.88	1371	.000*
	Untarred Road	237	2.66	0.734	0.048			31.18	31.18	371.54	.000*
Transport services influences a better patronage of the agricultural produce	Tarred Road	1136	4.40	0.842	0.025	40.881	.000	27.66	27.67	1371	.000
	Untarred Road	237	2.79	0.662	0.043			32.31	32.32	412.15	.000

Author's computation, 2020

4. CONCLUSION

The study observed that settlements connected by tarred had better transport services that created enabling environment for better patronage and gainful sales of farm produce. Therefore, it recommended the provision of more roads and rehabilitation of existing ones to improve accessibility to rural settlements and increases demands for farm produce and provision of more market centers to stimulate increase in traffic of freight and passengers in rural settlements in Nigeria other parts of the world.

Conflict of interest

The authors declare that they have no conflict of interest.

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Data and materials availability

All data associated with this study are present in the paper.

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